UNIVERSITY OF CALIFORNIA
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VISIBILITY LABORATORY
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VisLab File No. 003

To: Chief, Bureau of Ships
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Subj: NASA Interagency Fund Transfer R-139; Visibility Laboratory activities under Contract NObs-92058 for March 1966 on the development for NASA of computer techniques for performing visibility calculations

The first studies of the programming of visual search calculations were initiated during the month of March. In order to obtain an overview of the essential problems involved in the programming of this type of calculation, analytic expressions were assumed for properties of background directional reflectance, object directional reflectance, contrast transmittance properties of the atmosphere and window, and contrast thresholds for the visual system as a function of angular subtense for both on-axis and peripheral viewing. No great effort was made to make tight analytic fits. With respect to the visual thresholds, the best available data is limited in the periphery to $\pm 12^{\circ}$, and it was necessary to extrapolate this data to larger peripheral angles. The purpose of the study, however, is not to make precise calculations, but rather to investigate the techniques of problem solution. Good analytic fits can be substituted easily at a later date or, in the case of visual thresholds for the periphery, when appropriate data becomes available.

Using the analytic fits described above, computer programs have been written which allow computer calculation and automatic plotting of the region in space within which a specified object could be detected with a single visual fixation. The appropriate computer calculations needed to transform a series of such fixations into a probability of detection for a specific search pattern are currently receiving study.

Observer training has been completed for four observers who will be used in the vision experiments. The temporal forced-choice psychophysical method was used. Practice curves have stabilized, and computer

output for the early sessions is available. The experiments were performed for the case of centrally fixated 2^{o} circular uniform targets of positive contrast against a uniform adapting field of 100 ft-L with a stimulus duration of 0.33 seconds. Instrumentation for the experiments on detection of targets imbedded in a dark local background with bright surround has continued throughout the month.

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